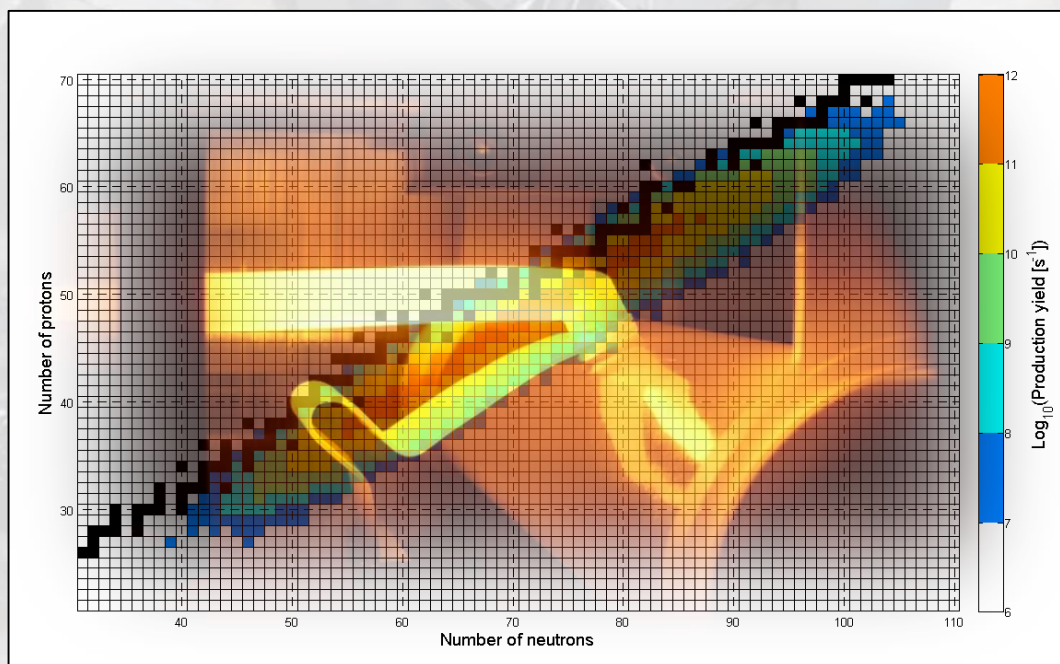
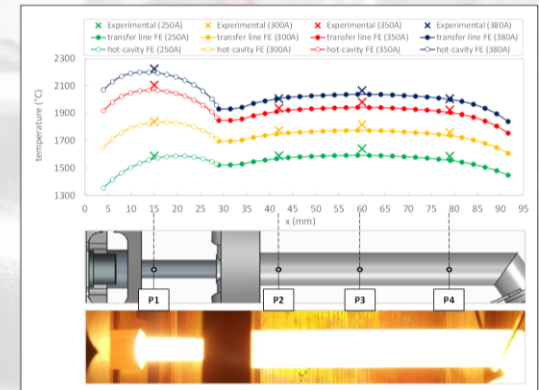
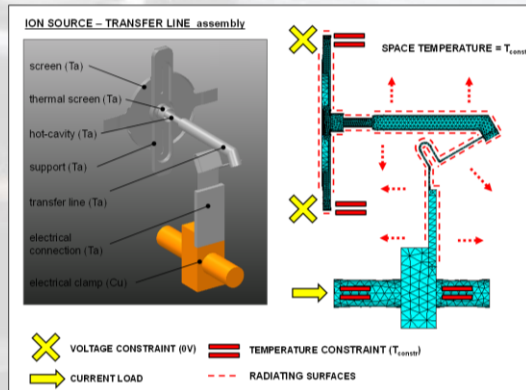
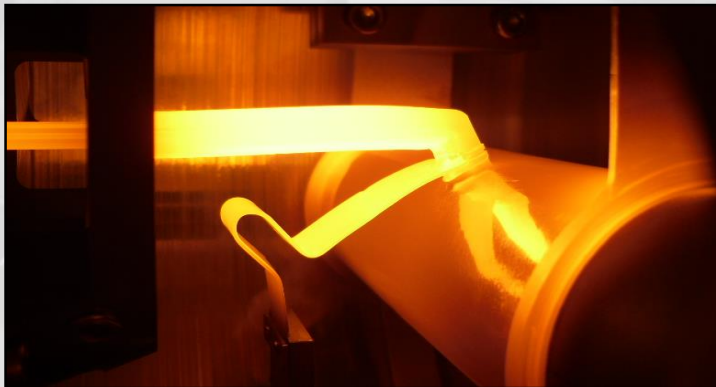


BeamLab activities at LNL

Mattia Manzolaro



- 1- Manpower
- 2- Equipment available @ LNL
- 3- Main tasks



Open competitive exam for the position of “ISOL ion source expert” (end of 2017)



ISTITUTO NAZIONALE DI FISICA NUCLEARE - SELEZIONE DI PERSONALE
DA ASSUMERE CON CONTRATTO A TERMINE - RIFERIMENTO LNL/T3/724

L'ISTITUTO NAZIONALE DI FISICA NUCLEARE INDICE UNA SELEZIONE PER TITOLI ED ESAMI PER L'ASSUNZIONE, PRESSO I LABORATORI NAZIONALI DI LEGNARO, DI UNA UNITÀ DI PERSONALE CON CONTRATTO DI LAVORO SUBORDINATO A TEMPO DETERMINATO, CON PROFILO DI TECNOLOGO DI III LIVELLO PROFESSIONALE, PER ATTIVITÀ DI SVILUPPO DI SORGENTI DI IONIZZAZIONE PER FACILITY DI TIPO ISOL.

PER LA PARTECIPAZIONE ALLA SELEZIONE SI RICHIEDONO:

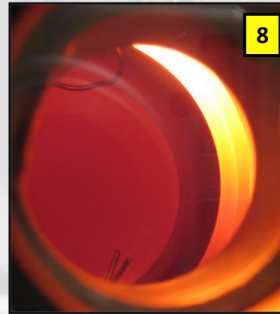
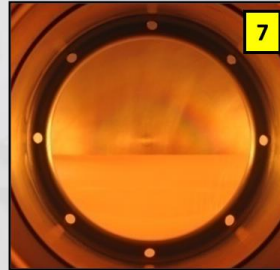
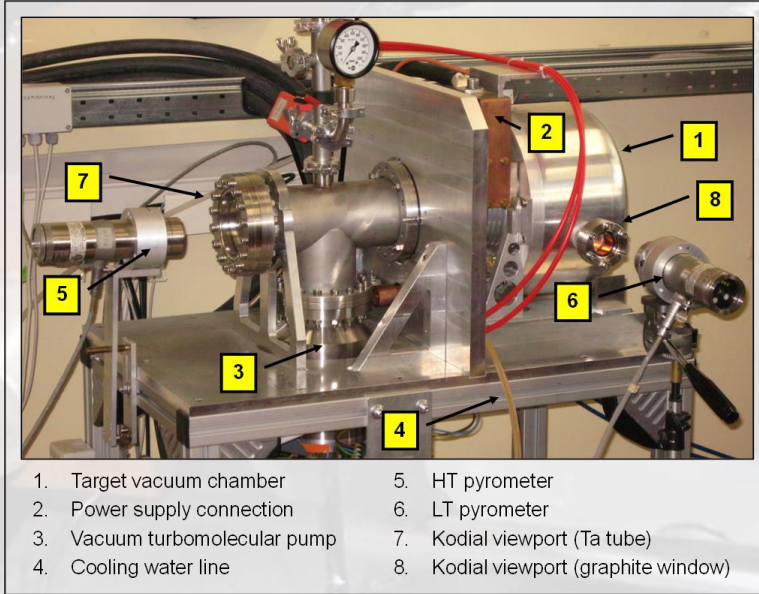
- IL POSSESSO DELLA LAUREA VECCHIO ORDINAMENTO IN INGEGNERIA MECCANICA O FISICA O DELLE LAUREE SPECIALISTICHE O MAGISTRALI IN TUTTE LE CLASSI EQUIPARATE AI SENSI DEL DECRETO INTERMINISTERIALE 9 LUGLIO 2009 SECONDO LA TABELLA ALLEGATA AL DECRETO STESSO;
- IL POSSESSO DEL TITOLO IN DOTTORE DI RICERCA IN INGEGNERIA INDUSTRIALE O IN FISICA O DI TITOLO EQUIVALENTE CONSEGUITO ANCHE ALL'ESTERO;

LE CANDIDATE E I CANDIDATI CHE ABBIANO CONSEGUITO ANALOGHI TITOLI DI STUDIO IN UNO STATO ESTERO DEVONO AVER OTTENUTO IL RICONOSCIMENTO DI EQUIVALENZA PREVISTO DALL'ART. 38 DEL D.LGS DEL 30 MARZO 2001, N. 165 E SUCCESSIVE MODIFICAZIONI E INTEGRAZIONI; TALE PROVVEDIMENTO DI EQUIVALENZA, OVE NON GIÀ OTTENUTO ALLA DATA DI PRESENTAZIONE DELLA DOMANDA DI PARTECIPAZIONE AL CONCORSO, DOVRÀ ESSERE OTTENUTO E PRODOTTO A CURA DELL'INTERESSATA O DELL'INTERESSATO, PENA L'ESCLUSIONE DAL CONCORSO, ENTRO E NON OLTRE IL 15° GIORNO SUCCESSIVO A QUELLO IN CUI HA SOSTENUTO LA PROVA ORALE.



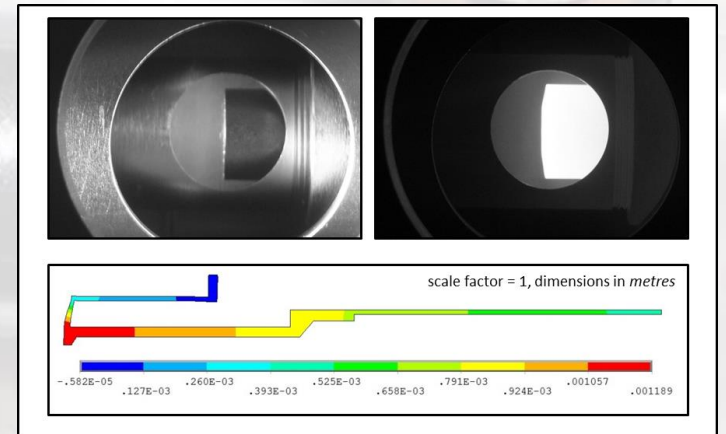
Alberto Monetti PhD (new contract starting in April)

The High Temperature laboratory

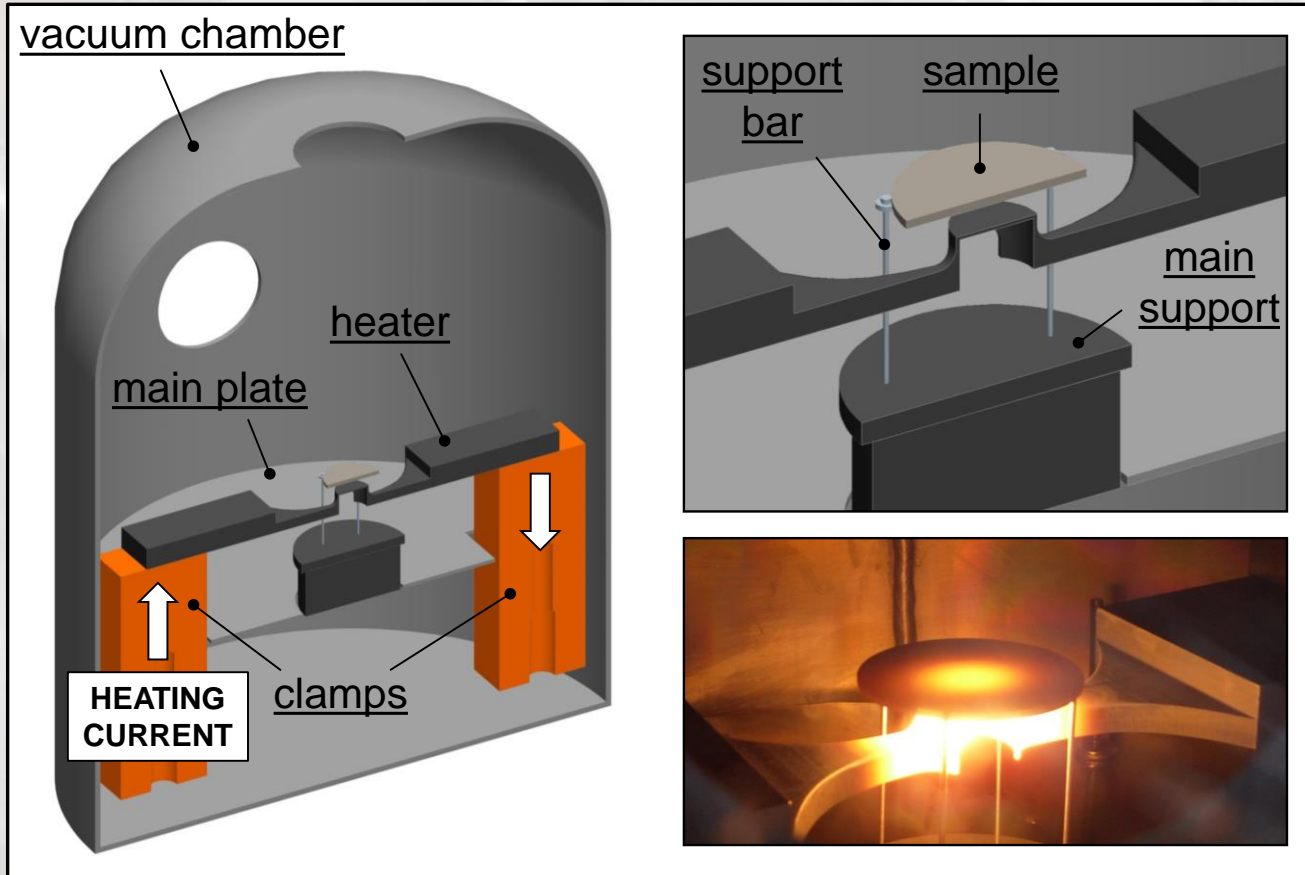


Temperature and Displacement monitoring for targets and ion sources @ high temperature levels

Focused experimental observations, endurance tests and numerical model validation (electrical-thermal-structural coupled field models)



The High Temperature laboratory



Emissivity ϵ meas. method

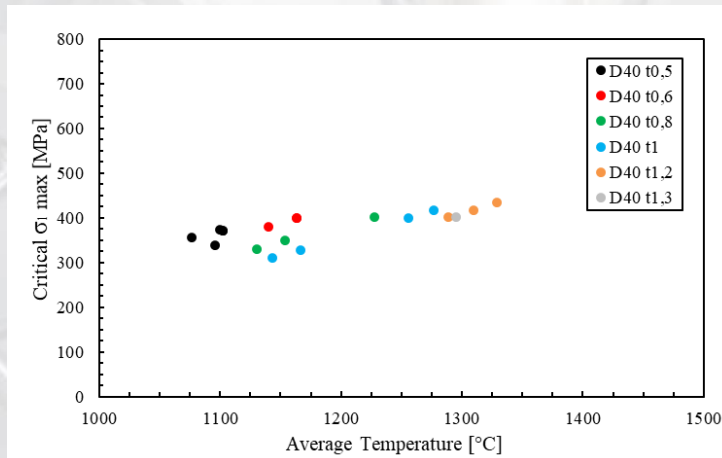
L. Biassetto, M. Manzolaro, A. Andrighetto, Eur. Phys. J. A 38 (2008) 167-171

Thermal conductivity λ meas. method

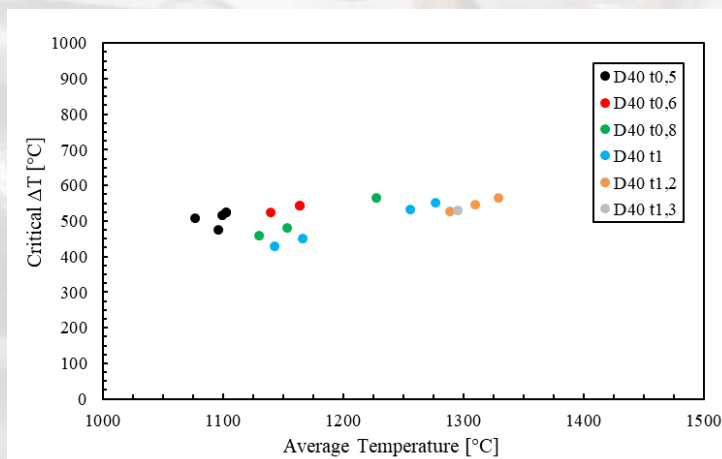
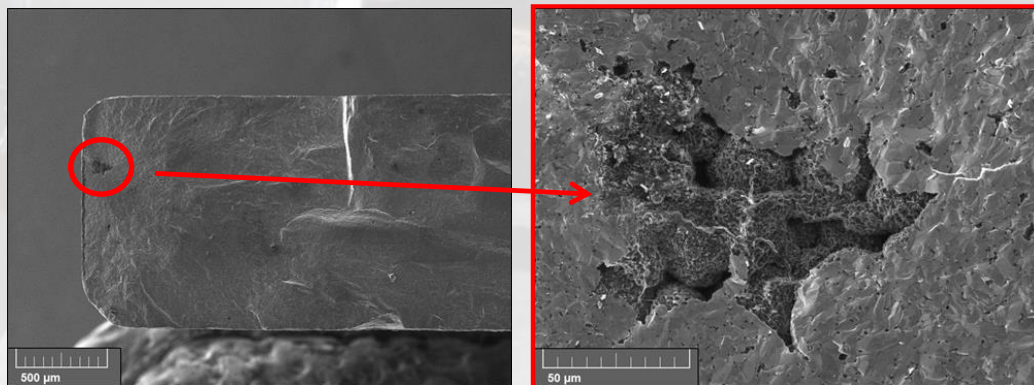
M. Manzolaro, S. Corradetti, A. Andrighetto, L. Ferrari, Rev. Sci. Instrum. 84, (2013) 054902

The High Temperature laboratory

SiC disk (Hexoloy SA) – Matteo Sturaro master's thesis, University of Padova
Supervisors: G. Meneghetti, A. Andrichetto, M. Manzolaro, M. Ballan

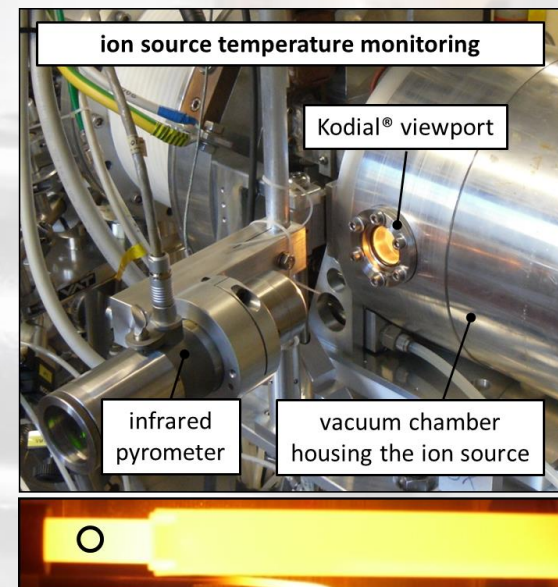
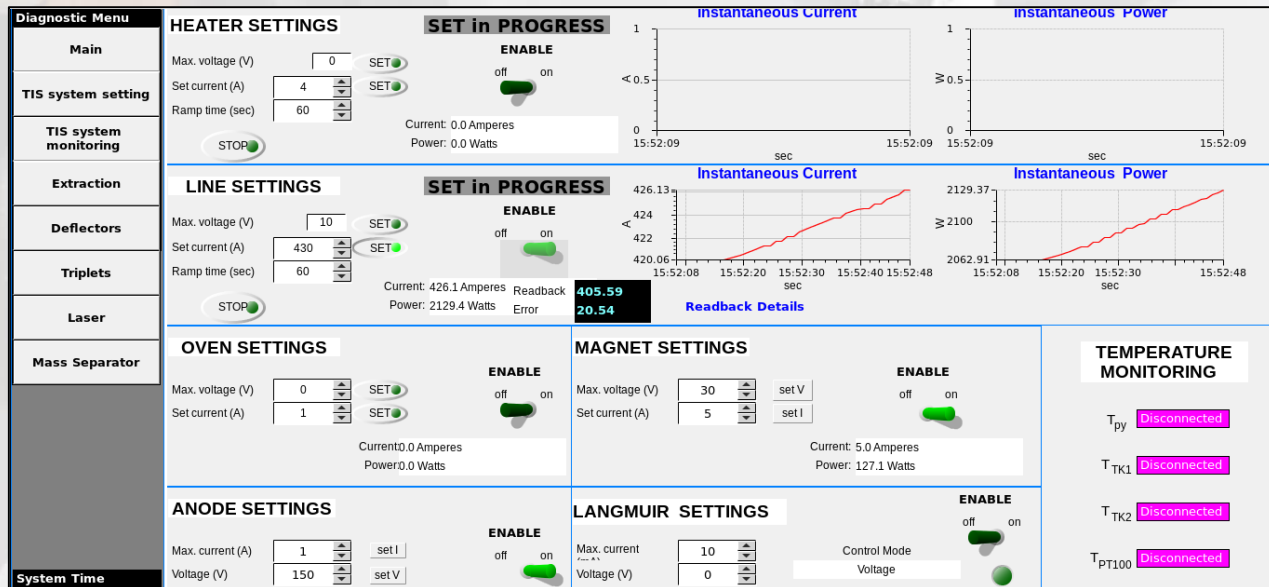
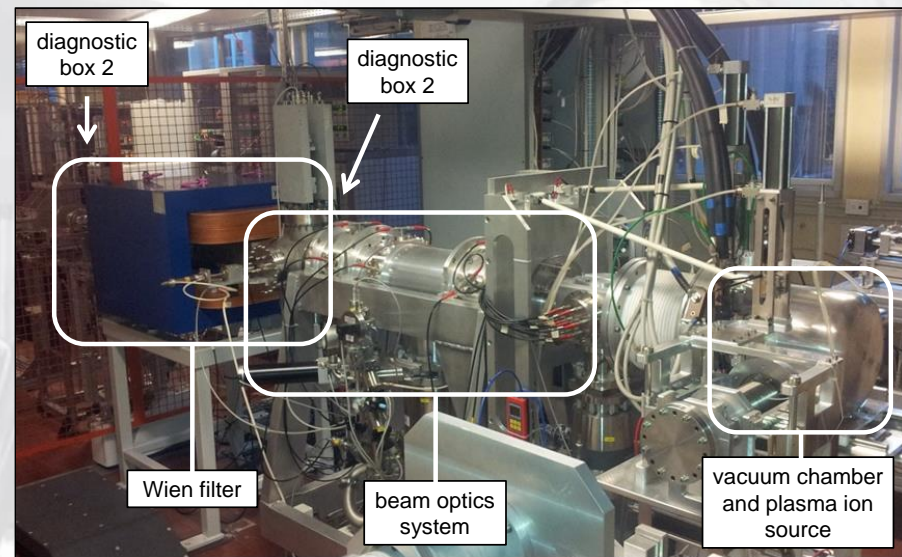


Experimental investigation of critical stresses and critical temperature gradients > primary beam specifics (FLUKA-ANSYS)

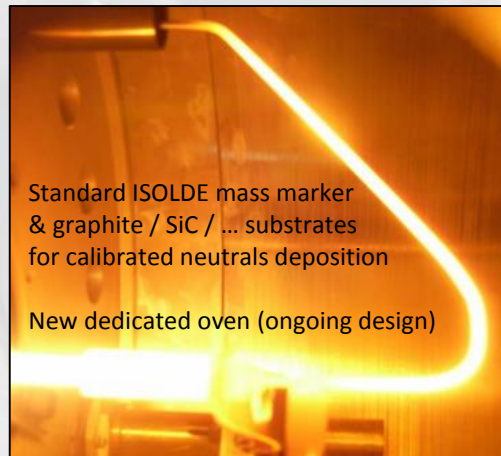
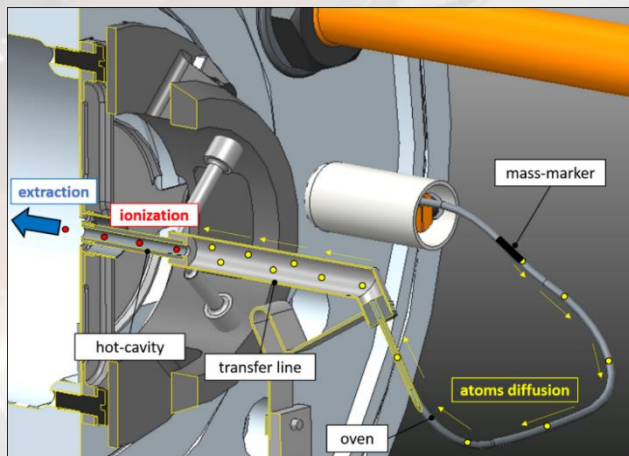


The Front-End laboratory

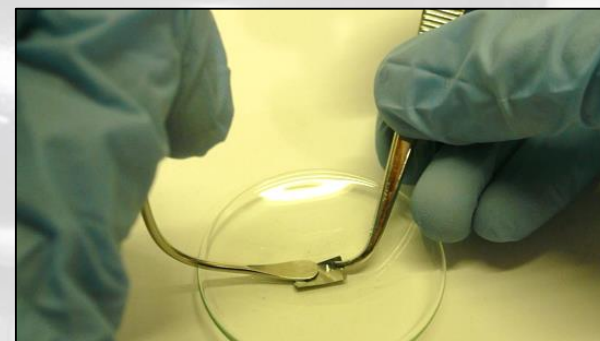
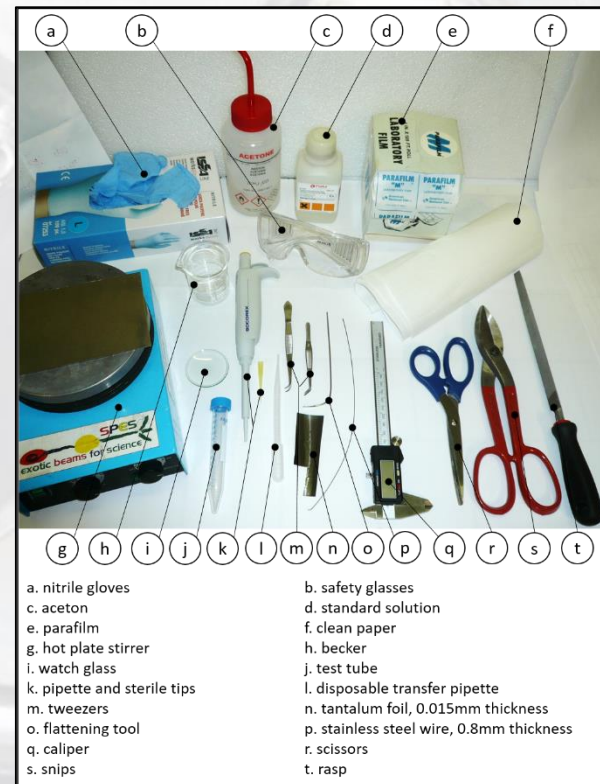
- Ionization efficiency measurements: neutral atoms, gaseous state (Ar, Kr, Xe, ...)
- Ionization efficiency measurements: neutral atoms, solid state (Al, Sn, Ag, ...)
- Transversal emittance measurements
- Testing of ion sources disconnected from the target
- Testing of ion sources coupled with the target
- Temperature monitoring during operation



The Front-End laboratory



New gas panel for the PIS



EURISOL JRA WP 14 First Periodic Scientific Report

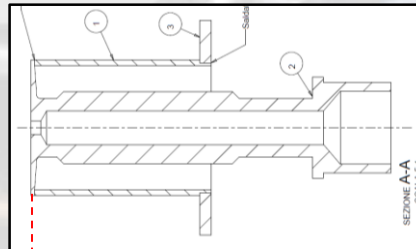
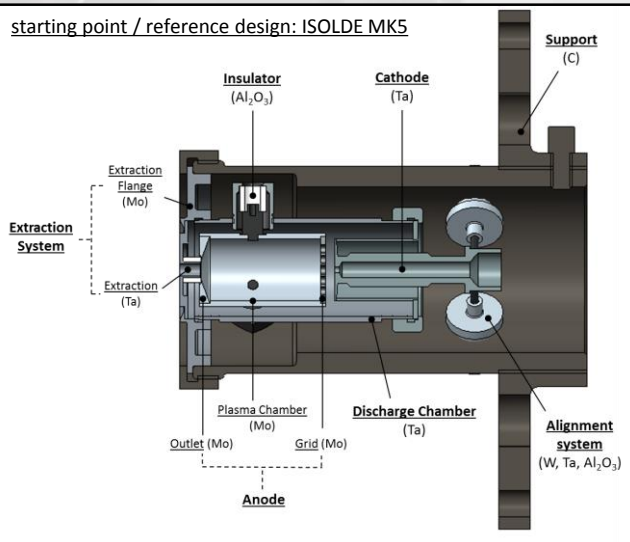
Subtask #2.1: EFFICIENT ION SOURCES FOR DIFFICULT ISOL BEAMS

INVOLVED LABORATORIES: CERN, LNL-INFN, IPNO, GANIL

The LNL-INFN contribution for subtask 2.1 is planned between 2018 and 2019. Most of the activities will be focused on the optimization of the SPES Plasma Ion Source (FEBIAD ion source based on the ISOLDE MK5 design), concentrating on its thermal-structural behavior, on thermionic emission and beam extraction. The aforementioned work will be developed making use of both numerical codes and dedicated experimental tests at the SPES off-line front-end. The final version of the SPES Plasma Ion Source will be opportunely characterized in terms of ionization efficiency and transversal emittance.

General improvement of the SPES Plasma Ion Source design: the optimized cathode and the alignment system

Ongoing characterization in terms of transversal emittance (varying different parameters) and ionization efficiency (for the following elements: Ar, Kr, Xe, Sn, Al, Ag, ...)



cathode optimized to avoid hot-spots and to maximize the anode current (electron current impinging the anode)

anode currents up to 250 mA ($V_{\text{anode}} = 150 \text{ V}$)

cathode alignment system reducing the thermal axial deformation of the cathode surface facing the anode

this is a good point to prevent the anode-cathode contact

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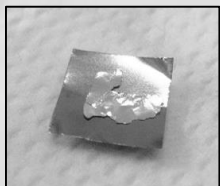
Subtask #2.3: NEW MOLECULAR BEAMS

INVOLVED LABORATORIES: CERN, LNL-INFN, IPNO, GANIL

At LNL-INFN, and taking as a reference the techniques developed at ORNL [15], the LNL-SPES group is preparing the upgrade of all the Plasma Ion Source auxiliary components required for the production of pure beams of germanium and tin isotopes starting from specific molecular beams (SnS^+ and GeS^+). In particular, the first tests will be done combining Sn with S powder, both inserted in a dedicated tubular oven (first samples ready to be tested and illustrated in the Figure 12). Then, in a second step, S will be introduced in a gaseous form (SF_6 and/or H_2S) inside the ion source. The LNL-INFN contribution for this subtask 2.3 is planned between 2018 and 2019.

First molecular beams under development at LNL: some preparatory tests and observations

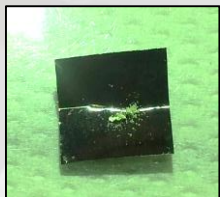
M. Manzolaro, D. Stracener, A. Monetti



Sn metallic foil



Sn beams start to be visible for oven temperatures ≈ 1350 °C.



Sn metallic foil
+
S powder



SnS and **Sn** beams should be visible for lower oven temperatures (tests will start soon).
Sharing of information, techniques and data with ORNL (Daniel Stracener)

EURISOL JRA WP 14 First Periodic Scientific Report

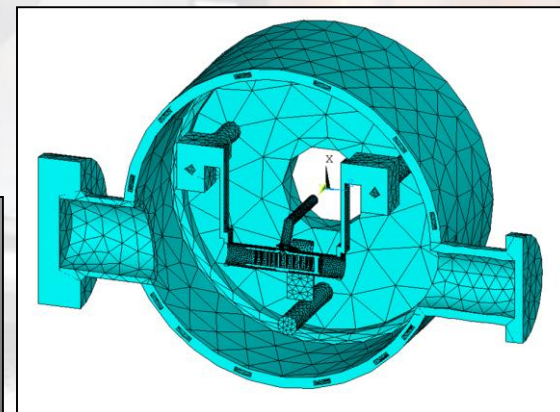
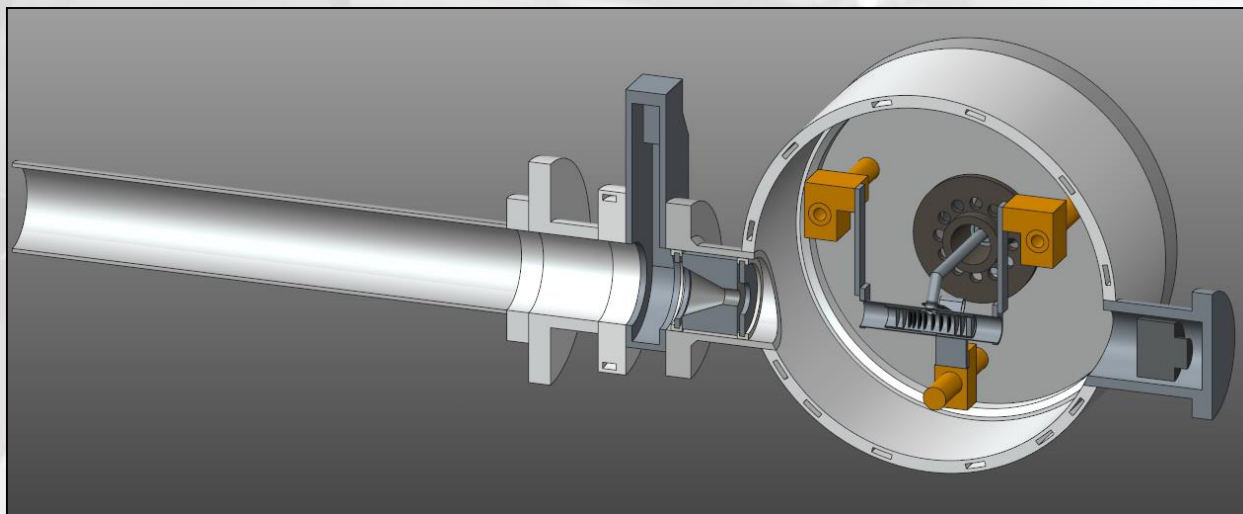
Subtask #2.4: SPECIFIC TARGETS DESIGNS FOR NON-VOLATILE ELEMENTS

INVOLVED LABORATORIES: CERN, LNL-INFN, IPNO, GANIL

At LNL-INFN, The LNL-SPES group is planning to complete within the first half of 2019 the design and the high temperature testing of the target that will be used for the first radioactive ion beam production at SPES. MonteCarlo simulations (FLUKA code) for production and power deposition will be performed, together with detailed coupled field electrical-thermal-structural analyses (ANSYS code). The aforementioned high temperature testing will investigate the behavior of the target and of all the temperature sensors that will be used for the machine protection system.

Target – Ion Source Unit modeling (FLUKA, ANSYS)

- Geometry simplification for ANSYS geometry import and meshing
- FLUKA models ready to run (for both SiC and UCx targets) for power deposition and production calculations
- Experimental apparatus for HT Joule heating testing and ANSYS model validation ready



THANKS FOR YOUR ATTENTION!

